

Date=29/07/2020

Lecture By=Shubham Joshi

Subject ⇒ Questions solving

IN PREVIOUS LECTURE (QUICK RECAP) Date-28/07/2020	In Today's Lecture (Overview)
Merge Sort In Python Question related Sort Merge Mcqs Questions For Self Practice	What is Upper Bound?? What Is Lower bound?? Questions that were Solved In Lecture

What is Upper Bound??

=an element **greater than or equal** to all the elements in a given set

In short

= In Len Upperbound means The Highest Index Of That len

What Is Lower bound??

=The **lower bound** is the smallest value that **would** round up to the estimated value


In short

Lower bound Means The Lowest index of given Len

=Complexity Of Lower bound is $\log(n)$

**Upper and Lower Bounds:
To the Nearest...**

The width of a rectangle is 5m and its length is 4m, both to the nearest metre. Write down:

5m

4m

5.5 x 4.5 = 24.75m²

a) Upper bound for the area.

b) Lower bound for the perimeter.

6m
 5.5m
 5m
 4.5m
 4m
 3.5m
 3m

Questions that were Solved In Lecture

Question 1

Given An array(sorted) You have to tell The upper And Lower Bound Of This Array

Code

```
def searchRange(self, nums, target):
    """
    :type nums: List[int]
    :type target: int
    :rtype: List[int]
    """
    if not nums:
        return [-1,-1]
    if len(nums) == 1 and target == nums[0]:
        return [0, 0]
    start,end = -1,-1
    low = 0
    high = len(nums)-1
    #Lower_bound
    while low < high:
        m = low + (high - low)/2
```

```

        # print(m,low, high)
        if nums[m] >= target:
            high = m
            if nums[m] == target:
                start = m
        else:
            low = m+1
    if nums[low] == target:
        start = low
    #upper_bound
    low = 0
    high = len(nums)-1
    while low < high:
        m = low + (high - low)/2
        # print(m,low, high)
        if nums[m] <= target:
            low = m+1
            if nums[m] == target:
                end = m
            if low < len(nums) and nums[low] == target:
                end = low
        else:
            high = m
    # print(low)
    # if nums[high] == target:
    #     end = high
    return [start,end]

```

*This code was taken from Leetcode

Question 2

Given an array you have to find occurrences of x

OR

Count number of occurrences (or frequency) in a sorted array

Code

```
# Python3 program to count
# occurs in arr[0..n-1]
def countOccurrences(arr, n, x):
    res = 0
    for i in range(n):
        if x == arr[i]:
            res += 1
    return res

# Driver code
arr = [1, 2, 2, 2, 2, 3, 4, 7, 8, 8]
n = len(arr)
x = int(input("Enter Number To Check Occurrence"))
print (countOccurrences(arr, n, x))
```

Mcqs

1.What is the time complexity of lower_bound function?

A.log(n)

B.O(1)

C.O(n^2)

2.What is the best time for insertion sort ?

O(n)

O(1)

O(nlogn)

Questions For Self practice / Assignment And CC

Q1. <https://practice.geeksforgeeks.org/problems/first-and-last-occurrences-of-x/0>

Q2. Try to solve the peak element problem in $O(\log n)$ complexity

Q3. <https://practice.geeksforgeeks.org/problems/number-of-occurrence/0>

Q4. <https://leetcode.com/problems/find-peak-element/>